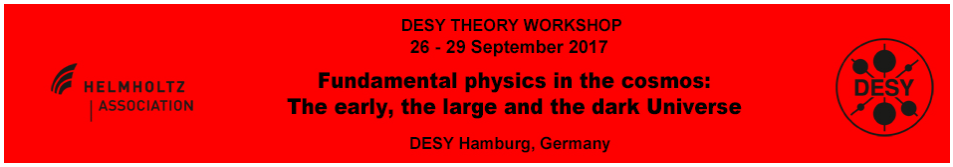

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Magnetic Fields, Baryon Asymmetry and Gravitational Waves from Pseudoscalar Inflation

Wednesday 27 September 2017 16:56 (17 minutes)

In models of inflation driven by an axion-like pseudoscalar field, the inflaton, a, may couple to the standard model hypercharge gauge field via a Chern-Simons-type interaction, $\mathcal{L} \supset a F \tilde{F}$. This coupling results in the explosive production of hypermagnetic fields during inflation, which has two interesting consequences: (1) The primordial hypermagnetic field is maximally helical and, thus, capable of sourcing the generation of nonzero baryon number around the electroweak phase transition (via the chiral anomaly in the standard model). (2) The gauge field production during inflation feeds back into the spectra of primordial perturbations, which leaves an imprint in the stochastic background of gravitational waves (GWs). In this talk, I am going to discuss the correlation between these two phenomena. To this end, I will (a) present an updated study of baryogenesis via hypermagnetic fields after pseudoscalar inflation and (b) describe the corresponding implications for GWs. As it turns out, successful baryogenesis is feasible – provided the axion couples to the gauge fields with a particular strength. Moreover, in the case of successful baryogenesis, one expects a characteristic peak in the GW spectrum at frequencies in the MHz range.

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